

ZOOLOGY.—*Some echinoderms from Biak, Schouten Islands.*¹ AUSTIN H. CLARK
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Biak (or Wiak) is the largest and most easterly of the Schouten Islands, a small group of islands just north of Geelvink Bay, New Guinea, in approximately latitude 1°S. It is 45 miles long and 23 miles wide. It is a low island, not rising more than 50 feet above sea level except at the southern end where there is a hill 800 feet in height.

Until the late war Biak was regarded as of little importance. It was remote from the Netherlands East Indies capital of Batavia, and the natives, addicted to headhunting and other unpleasant practices, were hostile to strangers. Few collections of any kind had ever been made there, and no echinoderms have ever been recorded from the island.

During the war the junior author, then a member of a 5th Airforce Photo Reconnaissance Squadron, was fortunate enough to spend four months at Sarido village within a stone's throw of a luxuriant coral reef. This reef is a fringing reef of rather insignificant proportions. It is perhaps 200 yards wide at the most and approaches quite close to the shore, which is sandy in the small embayment in which Sarido stands, and rocky southward toward the point on which the airstrip is located. In the little bay the actively growing reef is somewhat farther from shore than elsewhere and is separated from it by a strip of slightly deeper water, from 3 to 5 or 6 feet deep at low tide, with a sandy bottom on which are scattered living and dead clumps of coral and patches of eelgrass and algae. This is a rather restricted zone, grading rapidly into the active reef zone.

The reef itself is covered with water at all but the very lowest tides when a few of the highest coral prominences are exposed. It is made up of great masses of living coral, huge rounded heads of massive species many feet thick and submarine "brier patches" of branched madrepores in which reef fishes of indescribable colors hide by day. It is not an algal reef of the type found

in the Marshall Islands and generally throughout the Pacific. There is no prominent ridge of *Lithothamnion*, nor are these plants even present in noticeable numbers.

The coral masses afford precarious footholds, for the delicate *Acroporas* and other branched species are liable to give way, plunging one's foot into 4 or 5 feet of water and raking one's legs with razor-sharp edges in the descent. Among these coral masses are pools of deep water with sandy bottoms, providing a fine habitat for marine animals.

Two invertebrates especially force themselves on the attention of the collector, the giant clam, *Tridacna*, with its mantle rich shades of blue, green, and purple, and a starfish, *Linckia laevigata*, with a very small disk and long, rigid, cylindrical arms of the most outlandish blue imaginable. These two creatures are everywhere. Coral masses are studded with the multicolored zigzags formed by the clams, and the entire reef is dotted here and there on sand and coral alike with the brilliant blue 5-pointed stars.

The most interesting animals were less evident, and it required poking into dark crevices, turning over coral blocks, and stirring up sand pockets to find them. Occasionally one of the giant slate-pencil urchins, *Heterocentrotus mammillatus*, would be found in the open, though usually they were tucked away in remote nooks and crannies, their presence betrayed only by a stray spine or two projecting from a small opening, apparently much too small to allow the creature free passage. Cidarids could be found in similar situations, though they were much less common.

Turning over coral heads was a simple way of finding interesting things. Brittlestars were, of course, under every one, and those with large enough recesses often contained comatulids of unusual beauty. The less conspicuous starfishes also were often found in such situations. The little sand pockets under the rocks produced very interesting mollusks, such as the venomous cone shells, *Conus textile*, *C. striatus*, and *C. geographus*, not to mention dozens of less conspicuous things such as abalones (*Hali-*

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tis), several species of *Trochus*, *Mitra*, *Cymatium*, and many other genera.

The large starfishes *Culcita novaeguineae* and *Acanthaster planci* were found crawling about in the open, but because of their protective coloration were more often overlooked than seen. The latter is adorned with the most vicious 3-cornered spines imaginable. In collecting one of these the spines drew blood through a pair of heavy leather gloves.

Toward the outer reef the water deepens, the coral heads become more widely spaced, and, reaching the brink, one can look down the almost vertical wall into fathomless blue. Sharks were sometimes seen cruising along in the hazy middle distance, and always myriads of reef-fishes, moorish idols, parrotfishes, pomacentrids, wrasses, scorpionfishes, and many others. To the right and left on almost every coral pinnacle could be seen a huge black or deep red comatulid, gently swaying in the aquatic breezes. These seemed never to stray from their own chosen perch, for on several visits to the same spot we found them unchanged.

The occurrence of *Heterocentrotus mammillatus* at Biak is especially interesting, for only *H. trigonarius* has been definitely recorded from nearby New Guinea. *Heterocentrotus trigonarius* occurs in the Philippines and generally throughout the Pacific islands. It is replaced by *H. mammillatus* in the Hawaiian, Bonin, and Riu Kiu islands, which is also found at Lord Howe Island, in the Murray Islands at the northern end of the Great Barrier reef, and at Cape Jaubert, Western Australia.

The specimens listed below are in the U. S. National Museum, and the numbers following the names are those in the catalogue of the Division of Echinoderms.

CRINOIDEA

- Comantheria briareus* (Bell), 4, E.6935, E.6937, E.6939, E.6961.
Comanthus bennetti (J. Müller), 4, E.6963, E.6970, E.6972, E.6976.
Comanthus timorensis (J. Müller), 5, E.6936, E.6954, E.6962, E.6874.

- Comanthus parvicirra* (J. Müller), 5, E.6841, E.6842, E.6966, E.6971.
Himerometra magnipinna (A. H. Clark), 7, E.6957, E.6958, E.6964, E.6965, E.6973.
Stephanometra spicata (P. H. Carpenter), 1, E.6939.
Stephanometra protectus (Lütken), 1, E.6843.
Lamprometra palmata palmata (J. Müller), 4, E.6959, E.6960, E.6969, E.6987.

ECHINOIDEA

- Plococidaris verticillata* (Lamarck), 1, E.6967.
Eucidaris metularia (Lamarck), 3, E.6968.
Mespilia globulus (Linné), 1, E.6951.
Heterocentrotus mammillatus (Linné), 1, E.6977.

ASTEROIDEA

- Archaster typicus* Müller and Troschel, 1, E.6980.
Protoreaster nodosus (Linné), 1, E.6830.
Culcita novaeguineae Müller and Troschel, 3, E.6979.
Gomophia aegyptica Gray, 1, E.6828.
Nardoa mollis de Loriol, 2, E.6981.
Linckia laevigata (Linné), 4, E.6982–E.6984.
Linckia multiflora (Lamarck), 3, E.6986.
Linckia guildingii Gray, 1, E.6985.
Asterope carinifera (Gray), 1, E.6827.
Asterina cepheus (Müller and Troschel), 1, E.6831.
Othilia luzonica Gray, 1, E.6978.
Acanthaster planci (Linné), 2, E.6955, E.6956.

OPHIUROIDEA

- Ophiodera brevispina* (von Martens), 1, E.6950.
Ophiothrix longipeda (Lamarck), 1, E.6944.
Ophiocoma erinaceus (Müller and Troschel), 1, E.6952.
Ophiocoma scolopendrina (Lamarck), 2, E.6953.
Ophiomastix annulosa (Lamarck), 2, E.6949.
Ophiomastix lütkenii Pfeffer, 2, E.6948.
Ophiarthrum pictum (Müller and Troschel), 5, E.6946, E.6947.
Ophiarachna incrassata (Lamarck), 1, E.6943.
Ophiarachnella septemspinosa (Müller and Troschel), 1, E.6945.
Ophiolepis superba H. L. Clark, 5, E.6940.
Ophiolepis cincta Müller and Troschel, 2, E.6942.
Ophioplocus imbricatus (Müller and Troschel), 5, E.6941.